

April 4, 2005

REMOTE SENSING

Radar Imagery Aiding California Coastal Pollution Study

JASON BATES, WASHINGTON

NASA researchers recently completed a study using radar imagery collected by Canadian and European satellites to monitor pollution hazards off the coast of Southern California.

The effort is intended to demonstrate how the satellite imagery can help government officials make decisions in protecting coastal regions from pollution hazards, said Paul DiGiacomo, Earth missions concepts groups supervisor at NASA's Jet Propulsion Laboratory (JPL) in Pasadena, Calif.

"Coastal regions are very popular places for people to live, work and play, and a significant fraction of the U.S. population lives at coastal regions," DiGiacomo said. About 20 million people live near the coast of Southern California, nearly 25 percent of the U.S. coastal population, he said.

The study focused on three major sources of pollution for the Southern California region:

- Storm water runoff created when pollutants collected on concrete surfaces are washed into the ocean by storms;
- Discharge from wastewater treatment plants; and
- Seepage from oil drilling operations such as those in the Santa Barbara Channel and in Santa Monica Bay.

JPL scientists, along with researchers from the University of California at Santa Barbara and the University of Southern California in Los Angeles, combined radar imagery collected by the European Space Agency's European Remote Sensing Satel-

lites 1 and 2 and Canada's Radarsat spacecraft with ground-based measurements to study the impact of the pollutants.

"The notion of using satellites for these type of studies came up soon after satellites were launched," DiGiacomo said. "You can see a larger part of the ocean at one time, and you can revisit the area more quickly depending on the satellite and the sensor."

amount of pollutants in the ocean, DiGiacomo said. The ocean current data provided information on which direction the currents would carry the pollutants and how quickly, he said.

"Every observational tool has strengths and weaknesses and where you get the most value is by putting them all together," DiGiacomo said. "We point out the information

"We want to know where the potential hazards are going and where they will be tomorrow and where they will be in 48 hours and in 72 hours."

Paul DiGiacomo

The synthetic aperture radar, which can collect data regardless of weather conditions or time of day, offered advantages over sensors that operate in the visible spectrum, because storm water runoff data must often be collected in cloudy conditions, DiGiacomo said.

The satellite data was then combined with other ground-based measurements, including measurements of discharge from rivers in the region and ground-based radar data on surface ocean currents, DiGiacomo said.

The river flow data let researchers know how much water was being released into the ocean and when, and that information can be cross-referenced with the synthetic aperture radar data to detect changes in the

that satellite radar can provide and what it doesn't do, but when you put all of this together you have a robust system in place that can support our goal."

The Radarsat data was provided under the Radarsat-1 Application Development and Research Opportunity 2 program, a joint NASA and Canadian Space Agency effort designed to develop and demonstrate applications using Radarsat-1 data, DiGiacomo said. The European satellite data was provided by the European Space Agency under a separate JPL request, he said.

The current research effort was not intended to develop an operational system for monitoring pollutants but to demonstrate the utility of the data, which could lead to further research efforts, DiGiacomo said.

"What we wanted to do was better understand pollution hazards based on the information radar imagery gives us," DiGiacomo said. "We want to know where the potential hazards are going and where they will be tomorrow and where they will be in 48 hours and in 72 hours."

JPL already is participating in a regional Southern California marine water quality monitoring survey that involves more than 60 other organizations.

"There is ongoing work in this area, and our thinking was to further develop the use of radar imagery as a tool in the United States," DiGiacomo said. "We're trying to target this for U.S. coastal managers and get them to think of this as a tool to highlight now for urban coastal areas."

That project and future efforts will bring in other types of satellite data such as information from the Moderate Resolution Imaging Spectroradiometer (MODIS) instruments carried aboard several NASA spacecraft, he said. JPL also is looking at planned satellites, such as Canada's Radarsat-2, which is scheduled for launch in early 2006.

"One thing that is happening, and we would like to have happen, is to get a bigger groundswell of awareness of the capability of imaging radar for this application," DiGiacomo said. "Some people are aware, but there are many more that aren't. We're trying to publicize the capabilities and make sure this data is available in the future and use this and other data for future models."

Comments: jbates@space.com